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SCIENCE NEWS LETTER

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ASTRONOMY

Earth's Natural Satellites

Cloud-like, they can only be seen under favorable circumstances. They were photographed as faintly luminous patches for the first time in March.

► EARTH has two natural, cloud-like satellites. They travel in nearly circular paths at the same distance as the moon.

The two cloud-like satellites can be seen as faintly luminous patches with the unaided eye under exceptionally favorable circumstances. They are believed to be a swarm of tiny particles, or meteors.

The objects were found by Dr. K. Kordylewski of Krakow Observatory, Poland, who started searching for them telescopically ten years ago. Although the clouds travel in the same path as the moon, they are about 60 degrees behind it.

A special combination of circumstances is needed to make the clouds observable. Because they shine by reflected sunlight, as does the moon, they will be brightest when nearly opposite the sun. However, at such times, the moon is approaching full, so sightings are possible only when the moon is below the horizon.

At the same time the position of the 60-degree lag in their orbital path must be at

a considerable altitude, in order to lessen dimming of the objects' light due to passage through extra layers of the earth's atmosphere. The position must also lie clear of the faint light of the Milky Way as well as the so-called counter glow, or gegenschein.

The rarity with which this set of conditions is met helps explain why the clouds have not been seen previously.

Dr. Kordylewski's efforts to photograph the earth's cloud-like satellites were unsuccessful until this spring, when he recorded them on March 6 and April 6 using an f/1.5 camera of 50 millimeter focus, after taking special precautions.

A new search with very large telescopes might show individual meteors in the clouds, Dr. Kordylewski reports in *Sky and Telescope*, 22:63, 1961, a journal for astronomers published at Harvard College Observatory. Amateurs could also make naked eye observations.

• Science News Letter, 80:82 August 5, 1961

METEOROLOGY

Plan Atmosphere Study

► WHILE scientists aim for the outer reaches of space and explore the oceans and continents, other U. S. scientists are now quietly drawing up plans for a ten-year program to probe the earth's atmosphere.

Following in the footsteps of other similar programs in oceanography, space and geophysics, the atmospheric program will cover a wide range of activities, from the effects of atomic fallout to the control of hurricanes and tornadoes.

"The plan will be ready early this fall," Dr. Sverre Pettersen, University of Chicago professor who is in charge of the group of scientists planning the program, told *SCIENCE SERVICE* in a telephone interview.

In the past, efforts in meteorology have lagged far behind the other sciences, Dr. Pettersen said. With the mass of new data from rockets and satellites flooding the data centers, a long-awaited coordinated attack on the entire atmosphere is needed.

About 150 scientists, including many foreign scientists, met at the American Meteorological Society building in Boston to discuss the program. More conferences will probably follow before a definite program is set up.

"Although scientific efforts in general will be doubled in the next ten years, the atmospheric sciences must do more than this average to make up for past neglect," Dr. Pettersen emphasized. Some of the more important problems include atmospheric re-

search in arid underdeveloped regions, the effect of atmospheric circulation on dwindling water resources, and the effect of a changing environment on animals and insects.

The atmosphere is a huge envelope of air surrounding the earth up to altitudes of more than 500 miles. In its lower layers, tornadoes and hurricanes are born; in its upper layers, the sun's rays are trapped and short-wave radio signals are reflected.

The scientists are members of the National Academy of Sciences' "planning task force," making plans at the request of President Kennedy's special assistant for science and technology, Dr. Jerome Wiesner, to set up a national program in the atmospheric sciences.

• Science News Letter, 80:82 August 5, 1961

SPACE

Suborbital Space Hops Not Routine Yet

► SUBORBITAL space hops will not become routine for a long time—a man's life is at stake.

Yet some day suborbital flights will be as routine as test flights of experimental aircraft are today.

The National Aeronautics and Space Administration told *SCIENCE SERVICE* that Air Force Capt. Virgil I. Grissom, the second U. S. astronaut who flew to a height

of 118 miles on his 305-mile trip down range from Cape Canaveral, was better protected than many test pilots of new aircraft.

It is almost inconceivable that anything can happen to the astronaut on the suborbital trips. The escape rocket on the Redstone, which carried Capt. Grissom's Liberty Bell 7 capsule, is a better safeguard than the ejectable cockpit in many experimental planes.

It is possible that unforeseen occurrences could endanger the astronaut on orbital flights or in space, but on suborbital flights the possibility for only a partly successful mission, such as the loss of the Liberty Bell which sank in the Atlantic after Grissom's rescue, is greater than that the astronaut would get hurt.

• Science News Letter, 80:82 August 5, 1961

AERONAUTICS

Big Planes' Vapor Trails A Threat to Small Planes

► LIGHT AIRPLANES flying in the wake of heavy transports can be subjected to stresses that often exceed design limitations, a research project conducted at Langley Field, Va., shows.

The lighter craft run into vortex trails from the transports' wingtips. These trailing vortices—sucking whirlpools of air that "roll up" behind the heavier planes—can maintain their original strength for as long as a minute or more in very calm air.

Since the trails are invisible, there is little that the pilot of the lighter plane can do except stay alert on calm days in high-intensity traffic areas—whether or not another airplane is in sight.

"Reducing speed or flying either above or below the path of an airplane should reduce the magnitude of the load factors," the National Aeronautics and Space Administration reports.

Since most of these encounters are unexpected, trying to turn the smaller plane aside after flying into the vortices "may cause greater peak load factors than if the elevators were held fixed," NASA investigators found.

Calculations were based on the operational characteristics of a 2,000-pound single-engine light airplane and a light transport, as "penetrating" craft, and a heavy military transport, a swept-wing civil transport, and a proposed supersonic transport, as the "vortex-generating" craft. Simulated flight conditions involved the time shortly before landing or take-off, since the problem is most acute near airfields with a high volume of traffic.

For light airplanes, load factors exceeded design potential "by a comparatively large amount" in the wake of the heavy supersonic plane, NASA said. The loads are expected to become increasingly severe because of the current trend toward heavy supersonic transports with short wing spans.

• Science News Letter, 80:82 August 5, 1961

By cooling human blood as low as 50 degrees Fahrenheit, U. S. surgeons can operate on motionless hearts for more than an hour.

ANTHROPOLOGY

Dated at 1,750,000 Years

Man's early ancestor may have walked the earth nearly two million years ago, new dating of find from East Africa by potassium-argon method indicates.

► **ATOMIC DATING** shows that primitive man may have lived on earth 1,750,000 years ago.

Tests made on rocks surrounding *Zinjanthropus boisei*, found two years ago by Dr. L. S. B. Leakey in Olduvai Gorge, East Africa, show that this ancient man is about three times older than Dr. Leakey's tentative date of "more than 600,000 years." Dr. Leakey, a leading anthropologist in Africa, is curator of Coryndon Museum, Nairobi, Kenya.

The new date of more than a million and a half years will have important implications for the understanding of man's evolution, Dr. T. Dale Stewart of the Smithsonian Institution told **SCIENCE SERVICE**.

If *Zinjanthropus* lived 1,750,000 years ago, it makes human evolution reasonable. During this long time span modern types could have evolved from such early men.

The very ancient date for early man was found by the potassium-argon dating method. However, Dr. Stewart said, this method should be tested further and an exact margin of error worked out before it would be possible to say how correct the date is. Nevertheless, the scale of this dating is very likely correct, he said.

He pointed to the carbon dating method

for which a marginal plus or minus error has been worked out. The carbon method, with a limit of 50,000 years, has also been tested against objects of known age. However, sometimes samples from the same site have been cut into several pieces and given to different scientific institutions for carbon dating. Each laboratory has come up with a different answer.

The new date for *Zinjanthropus* was found by two geologists at the University of California at Berkeley. It was announced by the National Geographic Society, Washington, which supports Dr. Leakey's work.

Drs. J. F. Evernden and Garniss H. Curtis determined the age of rock samples in which *Zinjanthropus* was imbedded by

those of modern day primitive man in the recently developed potassium argon dating method, which measures the radioactive decay.

The samples contained a feldspar called anorthoclase, which is found in volcanic ash. The volcanoes erupted both before and after this ancient man lived. His remains, tools and the anorthoclase were sealed in the lava.

Over the ages potassium breaks down into calcium-40 and argon-40. In 1,000,200,000 years, half of any given number of potassium atoms decay. Replacing the missing potassium atoms are calcium-40 atoms and argon-40 atoms in the ratio of eight calcium to one argon. The calcium atoms cannot be used for dating purposes, but argon-atoms can be measured by a mass spectrometer.

The argon atoms in the rock surrounding *Zinjanthropus* were freed by a heating process and the atoms were then electrically charged. By means of a magnet they were deflected to an electronic counter and registered on a graph that showed the amount of argon formed and therefore the age of the mineral.

• Science News Letter, 80:83 August 5, 1961

ANTHROPOLOGY

Man's Ancient Ancestor

► **TEETH WERE** the clue that a "very remote and truly primitive ancestor" of man may have lived in East Africa considerably more than a million years ago.

The crowns of the teeth of this man-like creature have been found to resemble

Australia. The teeth of this remote ancestor differ from those of the South African ape-men (*Australopithecines*) in that they are longer, not as broad and more like human teeth.

This was found by Dr. L. S. B. Leakey, curator of the Coryndon Museum, Nairobi, Kenya, whose son discovered the lower jaw of the 11-year-old individual in November, 1960, on the same spot where Dr. Leakey found the first hand and foot bones of this ancient type earlier in 1960.

These finds were made in the same rock bed in Olduvai Gorge, Tanganyika, that contained *Zinjanthropus boisei*, popularly called Nutcracker Man because of his big teeth, found by Dr. Leakey and his wife in 1959.

The newer finds were made at a lower level than *Zinjanthropus*, which indicates these "men" lived at an earlier date. Dr. Leakey had estimated the date for *Zinjanthropus* as "more than 600,000 years." Now it is estimated at 1,750,000 years.

Stone and bone tools were found with the remains of the 11-year-old. If he or any of his family made these tools according to a regular pattern, these men bear the distinction of being true men, although very primitive.

If the analysis of the "child's" teeth is correct so that these "men" are not *Australopithecines* but early ancestors of modern man, they may have made their own tools as well as those found with *Zinjanthropus*. Dr. Leakey reports in the British scientific journal, *Nature*, 191:417, 1961.

Dr. Leakey has previously reported that the 11-year-old had been murdered by a blow on the head.

• Science News Letter, 80:83 August 5, 1961



DR. LEAKEY AND ANCIENT SKULL.

ECONOMICS

Food Stamps Get Trial

Pilot program under way. Limited now to eight unemployment-stricken areas. Full-scale application might raise nutritional level for low-income families.

► DEPARTMENT of Agriculture economists are hopeful that a pilot food stamp program now under way may lead to nationwide benefits for low-income consumers, farm producers and taxpayers.

The pilot program, limited to eight unemployment-stricken "distressed areas," is too small to have any impact on national economy. Full-scale application, however, might raise the nutritional level for low-income groups and boost farm income by redirecting farm productivity toward supplying proved needs, rather than piling up surpluses of crops not in demand.

The taxpayer? He might get a break by paying less for a food stamp program than for direct Government distribution of surplus foods. Stamps are exchanged for food at commercial markets, whose highly developed distribution system probably is capable of operating much less expensively than an untried Government-run system.

Food stamp operations began in June in sections of Illinois, Kentucky, Michigan, Minnesota, Montana, New Mexico, Pennsylvania and West Virginia.

Frederick V. Waugh, head of the task force for the pilot study, and Howard P. Davis, deputy director of the food distribution division of U. S. Department of Agriculture's Agricultural Marketing Service, report on the project in the current issue of *Agricultural Economics Research*, 13:74, 1961, a USDA publication.

They stress that the "essential thing" about the program is that low-income people can buy food at reduced prices, not that

people can buy food with stamps instead of money.

Needy families are allowed to take part after first being certified by state and local welfare agencies. Families with no income get the stamps free of cost. Most of the participants have some income, however, and are charged varying amounts for the stamps, depending on what they can afford to pay. The Government makes up the difference with Federal subsidy funds.

Participation by families and retail stores accepting the stamps is entirely voluntary. The stores can cash the coupons for face value.

A family must take enough stamps to assure an improvement in diet. They are not compelled to buy foods high in nutritional value, but are urged to spend their stamps as wisely as possible. They are allowed to buy "any food or food product" other than coffee, tea, cocoa (as such), alcoholic beverages, tobacco and products "clearly identifiable from the package as being imported from foreign sources."

The food stamp program was set up in part to help farmers sell nonbasic perishable commodities, such as meats, poultry and eggs, dairy products, and fruits and vegetables. There is indirect aid to corn and other feed grains.

The main surplus commodities, wheat, feed grains and cotton, are not affected. But programs extended to all needy families could "help to meet the general problem of overcapacity in agriculture," Mr. Waugh and Mr. Davis point out.

• Science News Letter, 80:84 August 5, 1961

"This latter task has become an impossibility for the physician," the editorial says, because of the rapid increase in volume of medical research.

Computers already are playing roles in medicine that include the statistical analysis of research data, simulation of physiologic systems, analogue-to-digital data conversion and interpretation, storage and retrieval of clinical records, and filing of information on drug action.

• Science News Letter, 80:84 August 5, 1961

Cotton must be planted on the Texas high plains as soon as the danger of frost is past because of the short growing season.

During the last half century a total of 1,027,332 *whales* have been killed, yielding 70,180,796 barrels of oil.

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MEDICINE

Computers to Aid MD's

► THE ELECTRONIC computer is seen as restoring the general practitioner to his former pre-eminence so that he can handle the bulk of medical practice once again.

An editorial in the *Journal of the American Medical Association*, 177:205, 1961, states imagination and personal relationships between doctor and patient are the only two areas in which computers would not function in the future.

"The medical student of the future may not be burdened with learning the great mass of statistical information" he now is expected to learn, the editorial predicts. Instead, he may put emphasis on accurate data collection and the patient's psychological and emotional needs as well as administration of particular forms of treatment.

In performing its tasks, the computer does just as well at two in the morning as at noon. It will not weigh most heavily its most recent experience as physicians are prone to do. It has the advantage of recalling accurately the correct statistics upon which to base its conclusion, and this conclusion will not be biased by irrelevant factors.

Another advantage, the editorial points out, is that once a program and statistical matrix of symptoms and diseases has been worked out for a particular group of diseases, this information may easily be used by most other computers.

As new information is published this may be inserted into the data matrix, allowing the computer to use this information with every subsequent decision it makes.

SPACE

Ranger Space Shot Slated

► THE UNITED STATES is almost ready to launch a spacecraft with the same basic design that later will be used in vehicles destined to rough-land instruments on the moon, then to make soft landings on the moon and planets.

Ranger I, however, will not be aimed at the moon. It will zoom off on a long curve into space, probably traveling 685,000 miles from the earth before it gets back into the earth's atmosphere and burns up. The round trip may take 58 days.

There is even a slim chance that the Ranger may reach earth-escape velocity and go into orbit around the sun.

Chief aim of the Ranger I shot, National Aeronautics and Space Administration says, is developing and testing "basic elements of spacecraft technology" needed for follow-up moon and planet missions. Ranger's complex system has 19,520 working electronic parts.

Besides the basic tests, Ranger has another important scientific goal. It will carry instruments for studying cosmic rays, magnetic fields, and radiation and dust particles in space.

The standard, or near-standard, spacecraft design was developed by engineers at Jet Propulsion Laboratory, Pasadena, Calif., operated for NASA by California Institute of Technology.

Ranger is basically hexagonal (six-sided). The hexagon has been termed the bus, be-

cause it will be used as an omnibus for carrying scientific instruments. The nature of the "passengers" will change in succeeding shots, but the basic craft form is believed sufficiently versatile to handle all succeeding unmanned missions.

Using experiments with a prototype proof test model to guide them, Ranger's builders began work on the actual flight model last February. The flight version was shipped from Pasadena to Cape Canaveral in late May. Final ground tests have been completed.

Ranger I is 11 feet long and about five feet in diameter at the base of the hexagon. In cruise position, with solar panels extended, it is 13 feet long and 17 feet wide. It weighs 675 pounds.

Ranger I has two radio transmitters and two antennas, one at the front and the other at the base. The base antenna is aimed at the earth, to assure transmission of data from far out in space.

The 8,680 cells in the two solar panels may pick up enough energy from the sun to generate 210 watts of electricity. If the attempt to collect solar power to keep Ranger operating is not a success, a silver zinc battery inside the hexagon will run the craft for two days.

Ranger will be launched by an Atlas-Agena B rocket, marking the first use of a new combination of two rockets used individually in earlier space shots.

All three Atlas engines will be burning at liftoff from Cape Canaveral's pad 12. Some five minutes later, when the last of the three burns out, Ranger should be up about 80 miles and some 350 miles down the Atlantic Missile Range.

Next, during a 25-second coast phase, explosive charges release the Ranger-carrying Agena from the Atlas. A pneumatically controlled pitch maneuver puts the vehicle into an attitude horizontal to the earth before Agena's single engine starts. When the engine first cuts off after two and one-half minutes, the vehicle should be in a nearly circular "parking" orbit around the earth, 100 miles up.

This coasting stage lasts for about 14 minutes. The Agena's engine then operates for another 90 seconds. Two and one-half minutes after final engine shutdown, and about 25 minutes after liftoff, springs separate the Agena from the spacecraft.

At this point the Ranger should be traveling at 23,800 miles an hour, a speed that will place it in a "highly eccentric" earth orbit. The farthest away the orbiting Ranger will be from the earth is estimated at 685,000 miles, and its nearest approach to the earth is estimated at 37,500 miles.

About one hour after launching, Ranger is expected to be in a position allowing its hinged solar panels to lock onto the sun and feed the craft's power demands.

• Science News Letter, 80:85 August 5, 1961

TECHNOLOGY

Rise in Transistor Sets Seen as Boon to "Voice"

► NATIVES of many remote and underdeveloped areas are hearing radio broadcasts for the first time, thanks to the rapid spread of low-cost receivers requiring only a few cheap batteries and no power lines.

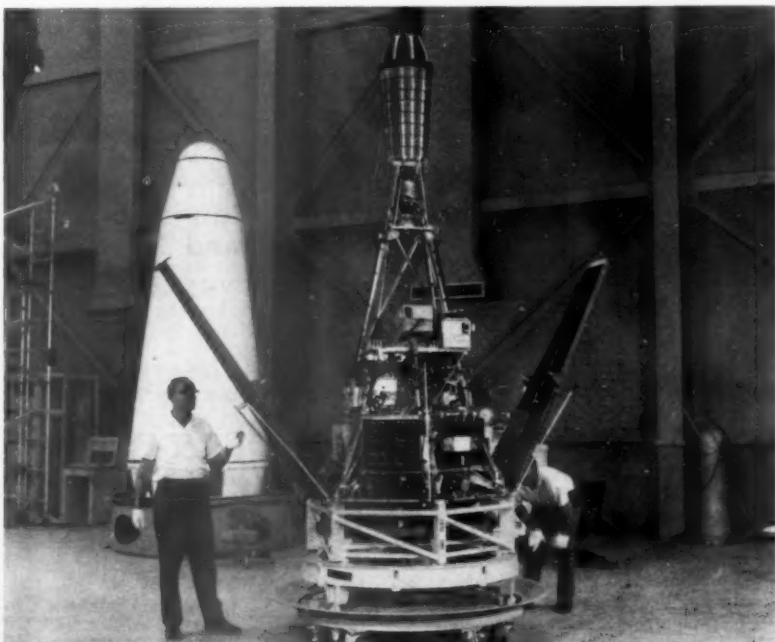
Officials of the Voice of America hail the transistorized sets as a welcome means of acquiring new listeners to America's story to the world via VOA, the U.S. Information Agency's international broadcasting service.

But the rise in receiver sales—and a corresponding 13% rise in shortwave broadcasting throughout the world—has also opened up vast new potential audiences for VOA's major competitors. They are Radio Moscow, Radio Peking, and the United Arab Republic's "Voice of the Arabs."

VOA hopes to meet the challenge through a long-range program that calls for ending current coverage deficiencies and "boosting signal strengths in the more important target areas where competition is greatest."

Recent Congressional action has helped. Legislators approved a \$24,000,000 domestic plant at Greenville, N. C., for better transmission to relay stations in Europe and the Mediterranean area, and a new \$13,000,000 relay station now being built near Monrovia, Liberia, in Africa.

Communists have been jamming VOA Russian-language broadcasts since 1948. United States technicians have fought buzz saw and siren noises with new electronic devices, high-power transmitters, high-gain antennas, simultaneous broadcasts of the



SUN-POWERED SATELLITE—The solar panels shown on either side of this Ranger spacecraft will be locked in place facing the sun during flight so that they can continuously deliver solar power to meet the craft's needs during orbit.

same program from different relay points, and around-the-clock broadcasting. In some cases, complete penetration of the jamming barrage has been realized. But jamming is still a key VOA problem.

Conceived during World War II as a means of combating enemy propaganda, the Voice has since developed a \$53,000,000 globe-circling network. VOA broadcasts in 35 different languages, offering newscasts, facts about U.S. policies, and information

on the life and culture of the American people.

The Voice operates 30 shortwave transmitters as a "feeder" link in the continental U.S. and nine overseas relay stations—at Tangier, Morocco; Munich, Germany; Thessaloniki and Rhodes, Greece; Luzon, in the Philippines; Okinawa; Colombo, Ceylon; Woofferton, England; and Honolulu, Hawaii.

• Science News Letter, 80:85 August 5, 1961

GENERAL SCIENCE

Read Few Journals

► A SURVEY of the reading habits of chemists and physicists shows that almost 50% of their professional reading is devoted to only 17 of the thousands of journals available.

The study was conducted by the Case Institute of Technology, Cleveland, Ohio, under National Science Foundation sponsorship. It was an outgrowth of an earlier (1957) project disclosing that chemists found time to read only about five percent of the wealth of recorded information published annually.

For the second study, researchers used 297 chemists and 404 physicists. Each carried a small electronic Random Alarm Mechanism (RAM) during waking hours for two weeks. When the device sounded alarms at random intervals, the scientist filled out a questionnaire indicating whether or not he was reading at the time, and if so, what. He was asked to maintain normal reading habits during the survey period.

Some of the findings:

Members of both groups read for an average of two hours weekly. Research chemists, however, spent more than twice as much time reading scientific journals as did non-researchers.

A total of 169 different journals (48 chemical, 59 physical and 62 general scientific) were noted as being read at least once. Chemists spent about half their reading time with ten favored journals, and physicists an equal amount of time with nine. Two publications, the *Journal of the American Chemical Society* and *Chemical and Engineering News*, appeared on both "top preference" lists.

Chemists read physical journals more frequently than physicists read chemical journals.

About 64% of the total reading was done at work, and about 24% at home. About 10% was done in libraries maintained by employing companies. None was done in public libraries.

Scientists who had published books or articles during the past five years did about 10% more reading than those who had not published.

Since the reading was "highly concentrated in a very small percentage" of published journals, the survey report suggests that low-use publications take steps to lower production costs. Additional investigation is recommended.

The report also explores the idea of condensing or abstracting more journal articles to cut both reading time and publishing costs.

In a pilot experiment, 16 graduate students working for operations research degrees read unpublished manuscripts either in their original form, in condensed versions, or in highly shortened abstract form.

They were then given written examinations, based on the major points in the original uncut article, to test their comprehension of the material read. There was "no significant difference" in the answers given by those who read condensations and the answers given by those who read the original articles.

The report, "An Operations Research Study of the Dissemination and Use of Recorded Scientific Information," is available for \$2.00 from the U. S. Department of Commerce, Washington 25, D. C.

• Science News Letter, 80:86 August 5, 1961

PHYSICS

Ceramics-Resin Mix Used as Heat Shield

► POROUS ceramics mixed with resin may be a highly effective structural material for heat shields to protect spacecraft re-entering the earth's atmosphere, scientists attending the Conference on Aerodynamically Heated Structures in Cambridge, Mass., were told.

Eric L. Strauss of The Martin Company, Baltimore, said resin-impregnated ceramics can withstand surface temperatures generated during re-entry ranging from 3,300 degrees to 4,000 degrees Fahrenheit.

Porous ceramics alone are potential shielding materials, but adding resin increases their strength and resistance to heat shock, Mr. Strauss pointed out. He said the material offers "distinct advantages" over metal shields.

At re-entry heat, the ceramic-resin mix works principally as a radiation shield. A cooling effect also is obtained when the heat causes chemical decomposition of the resin, sending a flow of gases through the ceramic to the surface of the craft.

• Science News Letter, 80:86 August 5, 1961

Color, which is one of the most important factors in the grading of tomatoes, can now be measured accurately by a colorimeter.

MEDICINE

Mosquito Gives Malaria To Monkeys in Nature

► A MOSQUITO that transmits malaria to monkeys in nature has been identified and reported for the first time.

Whether this species, *Anopheles hackeri*, also transfers monkey malaria to man has not yet been proved. The demonstration that *A. hackeri* is a natural carrier of one of the many species of simian malaria is an important link in the chain that may eventually explain what mosquito carriers are involved in the transfer of the disease in monkeys.

Drs. R. H. Wharton, Institute for Medical Research, Kuala Lumpur, Federation of Malaya, and Don E. Eyles, Laboratory of Parasite Chemotherapy of the Public Health Service's National Institute of Allergy and Infectious Diseases, reported the new identification of a Malayan mosquito in *Science* 134:279, 1961.

In the search for the parasite that causes malaria, more than 700 mosquitoes were dissected to find one sporozoite infection, that is, the phase of the developmental cycle when the parasite becomes infective to the mosquito's host.

An uninfected Indian rhesus monkey was inoculated in a vein with the sporozoites. Six days later small ring forms were seen sparsely in the blood. The infection built up so rapidly that the monkey died three days later. The parasites that caused the malaria were identified as *Plasmodium knowlesi*, a common form of simian malaria.

The infection has been transferred to another monkey and infected blood from this animal has been shipped to the U.S. for further study.

The U.S. is vitally concerned in international efforts to eradicate malaria. Approximately one-half of the world's population lives in areas exposed to malaria.

• Science News Letter, 80:86 August 5, 1961

PUBLIC HEALTH

Water Standards Revised and Improved

► RADIOACTIVITY concentrations in drinking water have been limited by the U.S. Public Health Service for the first time.

Dr. Luther L. Terry, PHS Surgeon General, said the radioactivity limits were three micro microcuries per liter for radium-226; 10 micro microcuries per liter for strontium-90; and 1,000 micro microcuries per liter for gross beta activity.

This is the first time in 15 years (since 1946) that drinking water standards have been revised. The standards, first issued in 1914, form the basis for legally regulating the drinking water used on trains, airplanes, buses and vessels in interstate commerce.

In the revised standards, requirements for water quality were generally raised. Few changes were made in bacteriological standards, but limits for certain chemical pollutants were added for the first time.

• Science News Letter, 80:86 August 5, 1961

GENERAL SCIENCE

U. S. Science Goals

► THE UNITED STATES made the wrong choice when it picked manned space flight as the main event in the current world-wide "scientific Olympic Games," the director of the Oak Ridge National Laboratory, Oak Ridge, Tenn., asserts.

Dr. Alvin M. Weinberg believes that "most Americans would prefer to belong to the society which first gave the world a cure for cancer than to the society which put the first astronaut on Mars."

He objects to concentrating American resources on space flight "on three grounds—hazard, expense and relevance."

Knowledge of radiation hazards in space is incomplete and uncertain, but space is known to be "a much more hostile environment than we had suspected even five years ago," Dr. Weinberg says.

He does not regard the \$20 billion to \$40 billion estimate of the cost of a round trip to the moon as realistic. He pointed out that ten years ago, experts estimated that a decade's work and the spending of \$1 billion would result in nuclear-powered aircraft.

"As it turned out, after ten years and an expenditure of \$1 billion, we have words, not nuclear airplanes, flying."

As for relevance, Dr. Weinberg prefers "issues which have more bearing on the world that is part of man's everyday environment" to either manned space flight or high-energy physics, the other expensive "spectacular" now getting major United States scientific attention.

Some of the alternative areas he suggests are molecular biology and the synthesis of living matter from non-living matter, uses of nuclear energy, water shortages, atmospheric pollution and chemical contamination of the biosphere.

The country's overall scientific strategy should first be extensively debated. Then "we should make a choice, explain it, and . . . have the courage to stick to a course arrived at rationally."

Writing in *Science*, 134:161, 1961, Dr. Weinberg contends that today's "Big Science" is afflicted with "journalitis, moneyitis, (and) administratititis."

Big-scale science needs wide support and thrives on publicity. Scientific and technical issues are argued in the popular press, rather than the scientific press, "or in the congressional committee room rather than in the technical-society lecture hall." Dr. Weinberg maintains that "the line between journalism and science has become blurred."

With more money available to science, scientists are in "a natural rush to spend dollars rather than thought."

Because of its growth, Big Science is becoming dominated by administrative bosses who do not understand science.

Dr. Weinberg also notes that "Big Science can ruin our universities" by diverting them from primary aims and turning professors into "administrators, housekeepers, and publicists."

Big Science may lead the country to financial ruin, Dr. Weinberg states. Ten percent of the annual Federal budget, or about one and six-tenths percent of the gross national product, now goes for research and development. At the present rate, the amount will double every seven years. Since the gross national product is doubling only at 20-year intervals, "we shall be spending all of our money on science and technology in about 65 years" unless steps are taken to reduce expenditures.

Dr. Weinberg suggests settling on a figure "something less than one percent of the gross national product" for Federal support of non-defense science, for a 15-year period.

"It is obvious that we shall have to devote much more attention than we now do to making choices between science projects in very different fields," he states.

• *Science News Letter*, 80:87 August 5, 1961

EDUCATION

Foundation Grant Aids Oxford Science Program

► A \$250,000 GRANT from the Ford Foundation will help Britain in its plans for training more scientists.

The money goes to Oxford University for teaching and research fellowships at St. Catherine's, a new college stressing the

natural sciences, set to open in October, 1962.

Total cost for the college is estimated at \$7,300,000. Most of the money will be raised from public and private British sources.

As many as half of the 400 student enrollments and more than half of the available fellowships at St. Catherine's will be reserved for science workers. In line with Oxford tradition, however, students in different fields will be mixed to establish closer working relationships between the sciences and the humanities.

Two years ago, the Foundation granted \$1,000,000 and British sources contributed \$9,000,000 to establish Churchill College at Cambridge University. Churchill also specializes in the sciences.

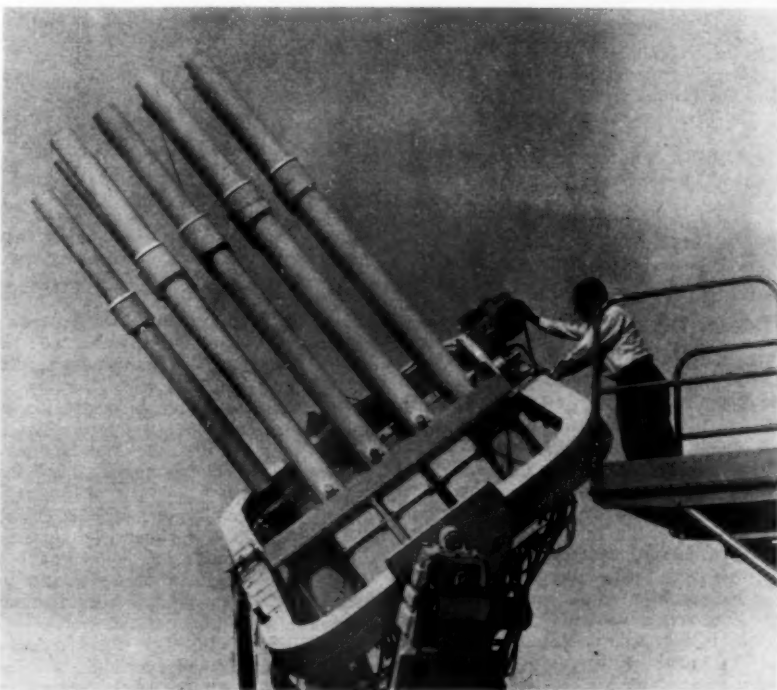
• *Science News Letter*, 80:87 August 5, 1961

TECHNOLOGY

Planet Pictures Made In Broad Daylight

► A NEW GIANT camera has taken pictures of the planets Venus and Jupiter in broad daylight. The camera, which has also photographed missiles, satellites and stars, consists of 19 long-barreled five-inch refracting telescopes. Planetary images, not visible to the eye during the day, were transmitted to an indoor screen and photographed with a precision-plate camera. The camera was built for the U.S. Air Force for tracking missiles and satellites at extreme distances in any kind of light.

• *Science News Letter*, 80:87 August 5, 1961



SHOOTING PLANETS—This is not a gun but a 19-barreled telescope for photographing planets during bright daylight.

ASTRONOMY

Bright New Comet Seen in Northeast

► A BRIGHT new comet that can be seen with the unaided eye has been discovered in the northeastern sky.

Of fourth magnitude, the comet is visible in the constellation of Gemini, the twins, to the west of Castor and Pollux low on the northeastern horizon an hour or less before sunrise.

The object has a well defined nucleus and a tail covering about 25 degrees. It also has an anti-tail. The comet was discovered on July 23 by A. Stewart Wilson of Seattle, who reported it to Harvard College Observatory, Cambridge, Mass.

Its position on July 26 was six hours, 49 minutes in right ascension and plus 33 degrees, 27 minutes in declination, observations reported by Dr. G. Van Biesbroeck of Yerkes Observatory, Williams Bay, Wis., showed.

• Science News Letter, 80:88 August 5, 1961

MEDICINE

Q Fever May Cause U. S. Health Problem

► Q (QUERY) FEVER, formerly known principally in Australia, is likely to become an increasing health problem in the United States.

An infected cow or other ruminant can transmit the disease to persons who have contact with such animals, which harbor the causative agent, *Rickettsia burnetii*. Dr. William H. Gallaher of the University of Utah College of Medicine, Salt Lake City, reports in the Journal of the American Medical Association, 177:187, 1961, that the changeable symptoms of the disease make it hard to diagnose.

The first case of central nervous system disease caused by Q fever was reported by Dr. Gallaher, who treated the patient, a 46-year-old potato farmer, at the Veterans Administration Hospital in Salt Lake City. The disease may masquerade as viral infectious hepatitis.

• Science News Letter, 80:88 August 5, 1961

MEDICINE

Treating Mother Advised In Childhood Asthma

► TREATMENT of asthmatic children should include treating the mother and the family as a whole, a pilot study at the University of Texas Medical Branch, Galveston, Tex., indicates.

The project, which is still going on, centers around the interplay between mothers and their asthmatic children seen at the allergy clinic. The investigators focused on the special pressures under which the mothers are living and had been living when they became pregnant.

"We found that as far as the mother's subjective opinion was concerned the asthmatic child had often come too early, too late or otherwise at an 'inopportune time' in the mother's life," Drs. Hendrik Lindt

and Armond S. Goldman said in Texas Reports on Biology and Medicine, 19:300, 1961.

The doctors warned against being deceived by the calm front a mother presents at an interview. Such a facade often has deceived doctors for long periods of time into focusing all their attention on the sick child, tacitly assuming that the mother was in no particular need of help, they reported.

Among the illustrations of cases was one of six children, none of whom had asthma except the patient, born when the mother was 40 years old. The baby had to be left while his mother went away to care for a sick parent, and got off to a bad start. He first had skin rashes and then asthma, which has continued.

"Although hypersensitivity provides a basic mechanism for bronchial asthma," the investigators said, "asthma may be called a disease of dependency and like other psychosomatic disorders has its origin in the mother-child relationship."

The physicians said that asthma is a "devastating experience to the child." He sees the advantages that come to him after such an attack and is stimulated to a clinging behavior.

• Science News Letter, 80:88 August 5, 1961

GENERAL SCIENCE

Tool "Libraries" Seen Spur to Basic Research

► THREE UNIVERSITY professors have evolved a plan to increase the scope and quality of basic research in the United States by establishing "libraries of instruments" at colleges and universities.

The proposal comes from Drs. Charles W. Gehrke and Thomas D. Luckey of the University of Missouri and Dr. Robert E. McDermott of Pennsylvania State University.

The idea involves common use of expensive tools by researchers in different, but overlapping, science areas, through instrument libraries and related interdisciplinary research laboratories.

This is practical, the authors maintain, because it is "more and more evident that the problems in medicine, biology, physics, chemistry and agriculture are reducing to the same common denominator in their basic theoretical and experimental needs."

Equipment would be available to both faculty and students for teaching and research.

"There will be savings in duplication of instruments, manpower and space, combined with a broader and more continuous use of the common instruments," the professors claim.

They recommend a program of state and Federal aid to help maintain the libraries, since lack of funds for equipment has "made it impossible for the universities to keep pace" with rapidly expanding research programs.

"In many cases the liberal arts colleges, small universities, and experiment stations are doing research at the 1945 level in regard to methodology and techniques," Dr. Gehrke commented.

• Science News Letter, 80:88 August 5, 1961

IN SCIENCE

EDUCATION

Grant Supports Teaching Of Tot-Teaching Parents

► PARENTS WHO WANT to teach their pre-school children how to read soon may be able to take a course to learn how to do it.

The Denver, Colo., school system has received a \$61,900 grant from the Carnegie Corporation to support a program to educate parents to teach their young children.

Many parents insist on trying to teach reading skills to curious tots, although school authorities frown on the practice. Denver educators, deciding that correct teaching methods should be publicized, last year launched a parental instruction program through a televised series and sale of a guidebook.

The Carnegie grant is for production of a televised course and a revised guidebook. Both will be used nationally after trial runs in Denver.

Teaching methods used in Denver were developed by Dr. Paul G. McKee and Miss M. Lucile Harrison, elementary education professors at Colorado State College, Greeley.

• Science News Letter, 80:88 August 5, 1961

METEOROLOGY

Sea-Going Robot To Watch for Hurricanes

► A SEA-GOING ROBOT, Nomad I, will spend the next five months in the Gulf of Mexico watching for hurricanes. (See also p. 95.)

The artificial "weatherman" is a platform 10 by 20 feet with four airtight aluminum wells filled with weather gear. It will be lowered into the Gulf 300 miles south of New Orleans.

At regular six-hour intervals, and every hour during high winds, the robot station will send weather data already measured and coded by the enclosed gear. At each transmission Nomad gives air and water temperatures, barometric pressure, wind speed and direction, and the direction of ocean surface currents.

The station sends by short-wave radio, using partly variable-tone pulse signals and partly international Morse code. Anyone with a short-wave receiver can pick up the nighttime signals.

Nomad is the joint product of the National Bureau of Standards, the Department of Commerce and the Navy's Bureau of Weapons. When seven pilot models have been established and proved as Navy stations in storm-producing areas of the Atlantic and Pacific Oceans, Nomad will likely be used by the Air Force and the Weather Bureau. Both the military and private and commercial ships and aircraft will benefit from the advance storm warnings from Nomad.

• Science News Letter, 80:88 August 5, 1961

NE FIELDS

GEOLOGY

Rocks May Be First From Lowest Crust Level

► ROCKS thought to be the first ever obtained from the deepest layer of the earth's crust are part of a new collection at the Woods Hole Oceanographic Institution, Woods Hole, Mass.

Using a new jam-proof dredging technique, the institution's research vessel CHAIN succeeded for the first time in taking samples from the north wall of the Puerto Rico trench. The trench is under three to four miles of water in an area north of Puerto Rico.

The haul included rusted specimens of rough-surfaced rock known as ultra basic rock to geologists. The rocks are believed part of a thick layer just above the Moho Discontinuity, a zone regarded by experts as the lower boundary of the earth's crust.

The full significance of the find will not be known until the rocks have been studied by specialists, said Dr. J. B. Hersey, chief scientist on the CHAIN cruise.

• Science News Letter, 80:89 August 5, 1961

MEDICINE

Medical Research Tool Found in Missile Device

► A VALUABLE medical research tool for studying blood has been unexpectedly discovered in a device used in connection with Navy Polaris missiles.

The device was invented by Philip J. Gilinson Jr. and Charles R. Dauwalter, both of Massachusetts Institute of Technology, as a testing tool to aid in developing gyroscopes used in Polaris missile guidance systems.

In medical work, the instrument is called the GDM Viscometer, after its developers, Mr. Gilinson, and Mr. Dauwalter and Dr. Edward W. Merrill, also of M.I.T.

Data has been obtained showing that blood plasma, the portion of blood that remains after red cells are removed, is thicker, or more viscous, at very slow rates of flow and is less viscous as flow speeds up.

Major advantages of the device as a viscometer, or instrument for measuring the viscosity of blood, are that a test requires only a teaspoon of blood (four cubic centimeters) and that tests can be performed in less than a minute.

The discovery that blood plasma is a non-Newtonian fluid, that is, a fluid in which viscosity changes with rate of flow, may help explain some of the curious mechanics of blood circulation in capillaries, the body's smallest blood vessels. It was previously believed that blood plasma was a Newtonian fluid, such as water, in which viscosity remains unchanged no matter how fast or how slow the blood flow is.

Dr. Merrill at M.I.T. and Dr. Roe E. Wells Jr. of Harvard Medical School and Peter Bent Brigham Hospital have collaborated for the past four years in an intermingling of engineering and medicine to study the fundamental chemical and physical properties of blood plasma and plasma containing such chemical additions as anti-coagulants.

In a series of experiments Drs. Merrill and Wells have found that the addition of anti-coagulant drugs, such as are given to victims of heart attacks to prevent recurrences, tend to make the plasma more Newtonian. Anti-coagulants, they discovered, tend to make plasma viscosity more constant and less dependent on flow rate.

• Science News Letter, 80:89 August 5, 1961

AEROMEDICINE

FAA Wants Upped Budget For Aeromedical Work

► A TRIPLING of the present annual million-dollar budget for civil aeromedical research during the next year has been urged by Federal Aviation Agency Administrator N. E. Halaby.

Mr. Halaby said the bulk of aeromedical research now is devoted to military pilots and airplanes, and space environment. He said much more should be known about such problems in civil aviation as the effects of environmental stress on air traffic controllers, the aging of airline pilots, and the effects of tranquilizers and antihistamines on pilots.

Mr. Halaby has asked Congress for a \$3,000,000 appropriation "to set up modern facilities." Research involving about 60 people now is conducted at Norman, Okla., "in the locker rooms of a World War II Navy gymnasium," he said.

As an example of why research is needed, Mr. Halaby noted that pressure groups are active in matters relating to the retirement age for civilian pilots. One group thinks the maximum age should be lowered from 60 to 55, and another thinks the maximum age should be extended even beyond 60.

• Science News Letter, 80:89 August 5, 1961

METEOROLOGY

Lack of Manpower Slows Weather Research

► MAN'S EFFORT to control the weather is hampered by lack of skilled manpower, the National Science Foundation said in its second annual report on weather modification.

New research opportunities "coupled with the great challenge and tremendous promise" of weather modification have begun to attract fresh, imaginative young scientists to work on the problem in United States graduate school laboratories, the report emphasized.

The NSF Weather Modification Program cost \$1,400,000 during the 1960 fiscal year, a \$250,000 boost from the previous year.

The Foundation now provides the largest measure of Federal support for research on weather modification.

• Science News Letter, 80:89 August 5, 1961

PHYSICS

Maser's Light Used For Photomicrograph

See Front Cover

► A RUBY MASER'S LIGHT has been used to take the photomicrograph of potassium titanate crystals shown on the cover of this week's SCIENCE NEWS LETTER. The needle-shaped crystals, which are one to two microns in diameter, are magnified 3,030 times.

The photomicrograph, believed the first ever made using a flash of light from an optical maser, was taken by J. S. Courtney-Pratt of Bell Telephone Laboratories. The burst of brilliant light from a ruby optical maser, which lasts less than one two-thousandths of a second, is particularly useful for photographing under the microscope rapidly growing crystals and other moving objects requiring intense light for short exposure periods.

• Science News Letter, 80:89 August 5, 1961

HORTICULTURE

Better Alder Produced By Irradiation of Seed

► AN ATOMIC TREE, grown from a seed exposed to nuclear radiation, is now thriving at the Holden Arboretum in Mentor, Ohio.

The tree is a variant of the European alder and is the sole survivor of several thousand seeds irradiated in reactors at Oak Ridge, Tenn.

The radiation, some 400 times the amount that kills a man, damaged all the seeds except the one that became *Alnus glutinosa* Holden, the Holden alder.

Within this one seed, a mutation, or change in heredity, occurred that made the tree more hardy than its parents. It is resistant to the leaf miner, which causes brown, blistered foliage. It has glossy deep green foliage, is much more ornamental than its ancestors and does not drop troublesome seeds as many other street trees do.

Lewis F. Lipp, the Holden horticulturist who planted the seeds in 1957 and produced the new tree, reported that the tree appears to be growing at normal alder pace and probably will reach 30 to 35 feet at maturity.

So far, it has had little opportunity to grow because many cuttings have been taken from it to propagate additional trees. A specimen has been given to the Morton Arboretum near Chicago and other arboreta will receive plants as they become available.

Studies of the new tree's chromosomes, the strands of basic heredity units, are now under way to determine just how irradiation changed the plant.

Regardless of the findings, the tree is living proof that irradiation occasionally can produce, within minutes, a beneficial change that otherwise would take years of selective breeding.

• Science News Letter, 80:89 August 5, 1961

TECHNOLOGY

Big Demand for Tiny Gadgets

Miniaturization, once largely a novelty, is now the basis for a flourishing new industry. Tiny devices are meeting the expanding needs of today, David Meier reports.

► THE SPECTACULAR GROWTH of a dynamic technological application called miniaturization is causing larger and larger segments of American "Big Business" to start thinking smaller and smaller.

While satellites whirl into orbit and automated factories spring to humming activity, demands keep increasing for tiny, efficient, reliable equipment to cut down the bulk of space-probe payloads and keep a factory's electronic "brain" from growing larger than the machines it controls.

Miniaturization, once a patience-trying plaything for artists and craftsmen who painted a portrait with a single sable hair or carved the Lord's Prayer on the head of a pin, has come into its own. It may, in fact, be the focal point for a "second industrial revolution."

Miniaturization enabled the United States to orbit lightweight satellites with data communications systems that out-perform those in the heavier Russian satellites.

It is the key to steady advances in the capabilities of electronic computers. It may revolutionize medical sciences by giving the surgeon and the diagnostician amazing new tools and tracking devices. It could open up vast new markets for products aimed at the rank-and-file consumer.

The rapid pace of miniaturization developments accelerated in 1948, when the hot, bulky, fragile vacuum tube, vital to electronic devices, gave way to the transistor.

Since then, the very term "miniaturization" has been changing to keep up with new trends and concepts. We now have subminiaturization, ultraminiaturization and microminiaturization, depending on the amount of shrinkage attained for each component or gadget involved.

The U. S. defense and space exploration program gave miniaturization its biggest boost.

Less Fuel Needed

The reasons are simple and extremely practical. The less that missile equipment weighs, the less fuel is required to launch it. The necessary fuel load can be reduced by as much as 100 pounds for every one-pound reduction in the weight of the equipment.

Even with lessened weight, fuel requirements are formidable, both for satellite-launching missiles and for tactical missiles used as war weapons. Tactical missiles with explosive payloads must include not only the hardware that operates the rocket, but navigational and radio equipment as well.

Miniaturization is also important to ground forces. Lt. Gen. Arthur G. Trudeau, the U. S. Army's research and development chief, points out that "the implications of a

ten-to-one weight reduction are important in the extreme" to soldiers and Marines who man-pack most of their weapons and equipment.

Progress is being made. The standard radio pack used in World War II, for instance, has been reduced from 40 pounds to 15 pounds, and may be down to five pounds by 1965. Far more phenomenal is the predicted three-pound weight by 1965 for the Army's radio replay multiplexer, which transmits several messages simultaneously. The unit used during the Korean war weighed 1,200 pounds.

Brief Case Computer

An electronic computer so small that it fits into a brief case is seen as a possibility by one of the companies making computers for business and industrial use. Data-processing equipment of the future may have miniaturized memory storage elements with "colossal capacities," the manufacturers say.

The tiny components are getting matching microcircuitry. New circuit-building methods are being reported almost daily.

Miniaturized mechanical parts, as well as electronics devices, are getting increasing

use. Miniature air cylinders, valves, manifolds and related equipment help conserve space in automated factories. Miniature ball bearings not much larger than the period at the end of this sentence are being used in gyroscopes, automatic pilots, electrocardiographs, anemometers and high-speed dental drills.

Medical applications of miniaturization are considered particularly promising. Doctors envisage a battery-powered television system, small enough to be swallowed, transmitting an "on the spot" pictorial report from a patient's stomach.

Already in use are an ingestible capsule that takes samples of stomach fluids, capsule transducer-transmitters that broadcast intestinal data, transmitters attached to teeth for studies of night grinding, and tiny probes to record the pulse, blood pressure, respiration and temperatures of astronauts.

A tiny instrument can be inserted into the heart through a vein in the arm, so that valve sounds can be heard from their source. Miniature electronic devices can be attached to the heart to supply a "beat" when the natural mechanism malfunctions. Miniature microphones, broadcasting to receivers the size of a cigarette package, may soon be used by doctors and the patients themselves to monitor heart activity.

Dental Drill Bearings

Tiny ball bearings assure the smooth operation of ultra-fast, painless, air-turbine dental drills with a speed of 250,000 or more revolutions a minute.

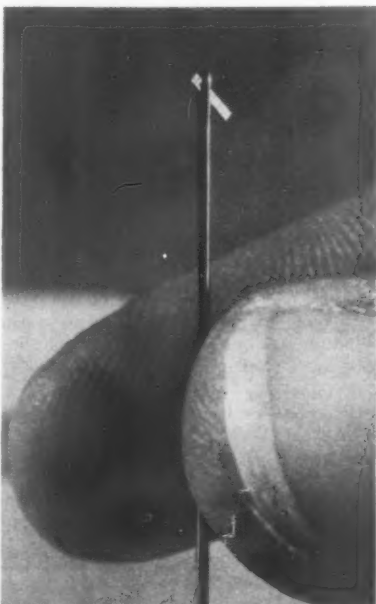
Miniaturization may allow one nurse to check the condition of dozens of hospital patients. Electronic skin thermometers could be connected to a central bank of indicator alarms, setting off an individual alarm if a patient's temperature changes radically. Miniature TV cameras would supply a look at each patient from the monitoring room.

Through transistor radios, camera equipment, tape recorders, tiny light bulbs and thumbnail-sized hearing aids, the consumer has become acquainted with the day-to-day potential of new miniaturized products. But there is reason to believe that the surface has not even been scratched.

A truly portable TV set and a two-way wrist radio are among the fascinating "things to come" in the consumer-market field. So are miniaturized electronic controls for automobiles, capable of maintaining highway speed, slowing the car to avoid obstacles, and stopping it in dangerous situations.

Despite the seemingly limitless possibilities, all is not sunshine, roses and fat profits for the manufacturer who goes in for miniaturization.

As things now stand, the smaller the item gets, the bigger the cost and the ultimate selling price must be. One producer has stated that a so-called "miniature" product justifies a 10% price raise over the normal-size version, a "subminiature" model calls



IN A NEEDLE'S EYE—Miniaturized logic element for use in electronic computers fits into the eye of a sewing needle. It was developed by Radio Corporation of America (RCA) Laboratories.

for a 25% to 50% hike, and a "micro-miniature" model can sell for as much as 100% more than the original.

Much of the production machinery must be especially designed, at least at the outset. Some firms have to build their own. Whole new plants may be required to eliminate dust, vibration and temperature variation.

Raw material costs are high for top-quality, long-life metals. The vacuum-melt steel used in miniature ball bearings, for instance, sells for \$5.67 a pound, compared to 24¢ a pound for ordinary cold-rolled steel.

Since miniaturization is a relatively new endeavor, companies often have to train their own experts. Production workers, too, need careful training.

Final assembly of very high precision parts may have to be done in sealed areas with air filtered to remove minute particles of dust. A complete absence of sunlight keeps heat from expanding the parts. Components must be handled with rubber gloves or tweezers to keep perspiration from corroding them.

Inspection and quality control expenditures run from 20% to 30% of manufacturing costs. The rigid requirements for much of the equipment necessitate costly testing

and a high percentage of waste.

Big profits are possible, however, and the opportunities are many and varied. The future is particularly bright for the manufacturer who can find new, economical ways of shrinking some part of a partially miniaturized product that still remains "unshrunk."

Man himself is the greatest known example of miniaturized efficiency, notes Horace D. Gilbert, president of Miniature Precision Bearings, Inc., Keene, N. H. A computer expert has described the human body as a ten-cycle computer in a one-tenth of a ton chassis with a one-tenth of one horsepower motor.

The number of elements inside the skull's bone box are infinitely greater than the number in the most advanced computers. Their microscopic size enables them to function so efficiently within such a small space.

"Is it not conceivable that someday man might create a computer as complex and as complete and as small as the human brain?" Mr. Gilbert asks. "Perhaps not, but the goal to aim at is there for us, and we now are on the trail in pursuit of it."

• Science News Letter, 80:90 August 5, 1961

INVENTION

Patents of the Week

Improved method makes diamonds from piles of discs under high pressures and temperatures. A device for locating crashed aircraft invented in Spain.

► AN IMPROVED METHOD for controlled "growing" of diamonds has been patented by Harold P. Bovenkerk, Saratoga, N. Y., who assigned rights to patent No. 2,992,900 to General Electric Company.

The Bovenkerk system is said to produce "superior individual diamond crystals." Discs of non-diamond carbon material, such as graphite, and discs of various metal alloys, serving as catalysts, are stacked alternately in a new type of reaction chamber. When high pressures and high temperatures are applied, the carbon changes to diamond form.

Mr. Bovenkerk indicated that the best results were achieved when the alloy was made from an elemental catalyst metal combined with one of the strong carbide-forming elements, such as titanium, zirconium, boron, silicon, iron, manganese and tungsten. The melting point of the alloys is lowered, and the diamond-producing catalytic reaction increases. Why this happens "is not understood at the present time," he said.

He said "true diamonds" that passed standard tests for quality and density were obtained. The method reportedly improves on previous techniques of "growing" diamonds in cluster formation, which may inhibit growth of individual diamonds and cause surface irregularities.

A device to enable rescue parties to detect

and locate crashed aircraft has been invented by Karl Edmund Devantier, Madrid, Spain, for which he was awarded patent No. 2,992,793. Planes would be equipped with battery-operated radio equipment in a small projectile, which would be catapulted automatically from the rudder tail unit at the moment of impact. The radio, protected by shock absorbers, would start emitting signals immediately, and would be parachuted to the ground or water near the crash scene.

Another invention was an improved method of converting salt water into fresh water. Norman D. Greene and Heinz F. Poppendiek, La Jolla, Calif., assigned rights to patent No. 2,992,977 to General Dynamics Corporation, San Diego, Calif.

The method used is thermal distillation, with the saline water first heated to vaporization temperature and the vapor then boiled off and condensed to pure water. Instead of the standard duct flow for the saline water, however, a whirling vortex flow is employed, producing much higher heat transfer and evaporation rates.

This, the inventors point out, makes their method more economical by heating the saline water faster, lessening the area of heat transfer surfaces, and greatly reducing the accumulation of salty crusts inside the boilers.

A simple, low-cost magnetic impulse

motor, powered by batteries, has been invented by Lee Devol, Dayton, Ohio. Movement between coils and a circle of permanent magnets ceases immediately if the motor stalls, permitting use of the motor for the winding of watches or clocks without danger to the mainsprings. The motor also is adaptable to miniaturization, Mr. Devol said. Rights to patent No. 2,993,159 were assigned to Hamilton Watch Company, Lancaster, Pa.

• Science News Letter, 80:91 August 5, 1961

AERONAUTICS

Jet Pilots Told How to Reduce Take-off Noise

► TO CUT THE NOISE from jet aircraft operating near residential areas, pilots have been advised to get the plane up as high as possible on take-off, then to reduce engine power as much as possible while flying over homes.

The counsel came from the International Air Transport Association, Montreal, Canada. Their technical committee approved recommendations offered by a study group of noise abatement experts.

The take-off climb should reach at least 1,500 feet, and normal climb power should not be resumed below 2,000 feet or until the plane is past inhabited areas, the Association said. Above 3,000 feet, however, the pilot should forget about noise abatement and concentrate on adhering to the flight path.

On the ground, civil authorities should see to it that potentially noisy areas near airports are not zoned for home building.

Airport administrations were urged to help by establishing ground and navigation facilities to assure use of minimum-noise flight paths.

The Association said that compulsory restrictions on sound levels at given points and aircraft take-off weights, or changes in jet operational schedules, are not necessary. They believe such regulations would interfere with efficient airline operations and passenger services.

The recommendations were called "a practical guide to making airports good neighbors as well as community assets" by Sir William P. Hildred, the Association's director general.

• Science News Letter, 80:91 August 5, 1961

Questions

ANTHROPOLOGY—How long ago may man's earliest ancestor have lived on earth? p. 83.

ASTRONOMY—What earth satellites have been photographed for the first time? p. 82.

Photographs: Cover, Bell Telephone Laboratories; p. 83, National Geographic Society; p. 85, National Aeronautics and Space Administration; p. 87, Andrews Air Force Base; p. 90, Radio Corporation of America; p. 95, NASA; p. 96, Eastern Safety Equipment, Co., Inc.

Books of the Week

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

THE ADVENTURING ROLE OF SCIENCE—Gaylord P. Harnwell—*Edison Foundation*, 13 p., illus., paper, single copies free upon request direct to publisher, 8 W. 40th St., New York 18, N. Y. Address presented at the Fifth Annual Science Youth Day Dinner, Philadelphia, 1961.

AIR BOMBARDMENT: The Story of Its Development—Air Marshal Sir Robert Saundby—*Harper*, 259 p., photographs, \$5. Covers the essentials of the history of bombers and their use, from World War I to the nuclear age.

THE ART OF CHILD PLACEMENT—Jean Charney—*Univ. of Minn.*, 265 p., \$5. Reprint of 1955 edition, to help social workers place children in foster homes.

ASPHALT: Its Composition, Properties and Uses—Ralph N. Traxler—*Reinhold*, 294 p., illus., \$10. Presents the chemical, physical, colloidal, rheological and durability properties of asphalt, its manufacturing and uses.

AXIAL FLOW FANS: Design and Practice—R. A. Wallis—*Academic*, 366 p., illus., \$10. Systematic handbook on the aerodynamics of ducted axial flow fans, taking in account the needs of the ventilating engineer.

BIBLIOGRAPHY OF INTERLINGUAL SCIENTIFIC AND TECHNICAL DICTIONARIES—*Unesco (Int. Doc. Service-Columbia)* 4th ed., 236 p., paper, \$3.50. Introduces 900 new dictionaries and 133 new editions of works mentioned in the past.

A BIOLOGY OF CRUSTACEA—James Green—*Quadrangle Bks.*, 180 p., illus., \$5.75. General background dealing with those aspects of biology which concern the whole intact animal, such as feeding, locomotion, blood circulation, growth, behavior, parasitism and distribution.

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U. S. GOVERNMENT GRANTS UNDER THE FULBRIGHT AND SMITH-MUNDT ACTS: Program Announcements, 1962-63, University Lecturing, Advanced Research—*Conference Bd. of Assoc. Research Councils Committee on International Exchange of Persons*, 100 p., paper, free upon request direct to publisher, 2101 Constitution Ave., Washington 25, D. C. General and spe-

cific information on available Fulbright scholarships, closing date for applications: October 1, 1961.

THE U. S. A. ANSWERS: A Guide to Understanding—Kenneth E. Beer, Ed.—*U. S. & World Pubs.*, 248 p., illus., \$5; paper, \$2.50. Answers to 1,800 questions prepared for the IBM RAMAC 305 computer set up in 1959 at the American Exhibition in Moscow. Science Service cooperated on the section of American science and technology.

UNITED STATES GOVERNMENT ORGANIZATION MANUAL, 1961-62; Revised as of June 1, 1961—Office of the General Register—*GPO*, 821 p., paper, \$1.50. Official organization handbook of the Federal Government, describing agencies in the legislative, judicial and executive branches.

UNRESTING CELLS—R. W. Gerard—*Harper*, 434 p., illus., paper, \$2.25. Reprint of book first published in 1940, giving layman a picture of living things and their actions.

VISION RESEARCH REPORTS—E. Porter Horne and Milton A. Whitcomb—*NAS-NRC*, 182 p., illus., paper, \$2.50. Summaries of scientific papers presented at 36th, 37th and 39th Annual Meetings of the Armed Forces-NRC Committee on Vision.

VITAMINS AND HORMONES: Advances in Research and Applications. Vol. 18—Robert S. Harris and Dwight J. Ingle, Eds.—*Academic*, 615 p., illus., \$15. Includes papers delivered at the Symposium on Vitamin A and Metabolism, held in Switzerland in 1960.

WATER PURITY: A Study in Legal Control of Natural Resources—Earl Finbar Murphy—*Univ. of Wis. Press.*, 212 p., \$4.75. A fully documented account of the historical development of the control of water pollution, from early England to the Blatnik Act of 1956.

WILDLIFE IN THE NORTHERN ROCKY MOUNTAINS: Including Common Wild Animals and Plants—William H. Baker and others—*Naturegraph*, 112 p., 400 illus., \$3.50; paper, \$1.95. Pocket guide for trips through the region.

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THE WONDERS OF ALGAE—Lucy Kavalier—*Day*, 96 p., illus., by Barbara Amlick and Richard Ott, photographs, \$3.50. Describes generally marine and fresh-water algae, and tells young people about their space age uses.

THE YOUNG EXPERIMENTER—N. F. Newbury and H. A. Armstrong—*Sterling*, 96 p., illus., \$2.95. To help the budding scientist become familiar with testing, recording observations and thinking out problems.

• Science News Letter, 80:92 August 5, 1961

It takes 115 gallons of water to grow enough wheat to make a loaf of bread.

Sales of apples averaged 27% more with a promotion program than without.

Ice water is an effective method for treating burns, a recent scientific study showed.

Modern corn has now become completely dependent on man for its survival and probably would soon become extinct without man's ministrations.

One of the earliest standards of measurement was the *cubit*, which was the length of the forearm from the point of the elbow to the tip of the middle finger.

AGRICULTURE

Unusual Feed Suggested For Malayan Cattle

► **TAPIOCA ROOTS**, rubber-seeds and coffee bean pulp are just a few of the foods Malayan cattle may be eating soon due to the shortage of fodder in Malaya.

A processing engineer with the Food and Agriculture Organization, Melle Zwankhuizen, said that the population explosion has resulted in "not only the problem of increasing food production, but also of increasing feed production." He has suggested that the Malayan Government exploit local raw materials and manufacturing "wastes."

Mr. Zwankhuizen was mainly concerned with increasing production of rice and coconut, which the natives could eat. The wastes could feed the cattle. He also suggested the use of cacao pods, coffee bean pulp with molasses, and dried pineapple bran from cannery wastes.

Even roots and their by-products can be used for feedstuffs: the trunk of the sago palm, chopped sweet potatoes and their leaves, and tapioca roots and waste.

"The possibilities are endless when such a search gets under way," Mr. Zwankhuizen said. He mentioned the possibility of using palm kernel cake, rubber-seeds, seaweed, and distillery by-products as feed.

• Science News Letter, 80:93 August 5, 1961

PSYCHOLOGY

Bat's System May Enable Blind to "See"

► **MAN MAY** soon be able to "see" in the dark using the same system of sound location as bats. Blind persons could also use the method.

Even when blinded, bats can unerringly locate objects because they "see" by means of a complex, echo location system that resembles sonar. An electronic device to duplicate the bat's method for use by humans has been built by L. Kay of the University of Birmingham, England.

Bats probably use a frequency modulated system of location, Mr. Kay reported in British Communications and Electronics (Aug.).

• Science News Letter, 80:93 August 5, 1961

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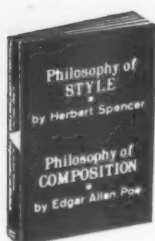
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HEMATOLOGY

Tracers for Blood Study

► RADIOACTIVE tracers are being used in Greece to increase medical knowledge of two hereditary blood diseases often fatal to children. Scientists hope radioisotope techniques will point the way to effective treatment methods.

The diseases are thalassemia, or Mediterranean anemia, and sickle cell anemia. Both are caused by inherited defects leading to abnormal production of hemoglobin, the oxygen-carrying pigment in the red blood cells.

In thalassemia, the fetal hemoglobin (hemoglobin F) present in unborn children persists after birth instead of being replaced normally by adult hemoglobin (hemoglobin A). In sickle cell anemia, an abnormal hemoglobin S is produced instead of the A type, and red blood cells change from their normal round shape to crescent or sickle shape, finally breaking down completely.

A recent survey in Greece showed that more than seven percent of the population carry the hereditary thalassemia trait. Sickle cell disease also is found in Mediterranean countries and in Asia, although it is more common in tropical Africa.

Work with the tracers, iron-59 and chromium-51, is being done on patients at the University of Athens' clinical therapeutics department, supported by an International Atomic Energy Agency research contract. Dr. E. H. Belcher of the Post-graduate Medical School, Hammersmith, London, reported on the project in the IAEA Bulletin, 3:20, 1961.

He points out that although blood transfusions may save the lives of some patients and removal of the spleen (an organ that disintegrates red blood cells and frees hemoglobin) may benefit others, no treatment is known to correct basic hemoglobin production defects. For research investigations, "radioactive tracer techniques have been found especially valuable."

Iron-59 is used to trace iron metabolism and hemoglobin production, which are closely related. Injected into a human vein, iron-59 is taken up by maturing red cells in the bone marrow and used to make hemoglobin. By taking frequent blood samples, researchers can follow the disappearance of the radioactive substance from the blood and its reappearance in red cells. Radiation counters placed over different body organs also follow changes. "Such measurements readily reveal any abnormality in hemoglobin synthesis and red cell production," Dr. Belcher said.

Chromium-51 is used to label red cells in a sample of the patient's blood, which is then reinjected. The progress of these cells also is followed through sampling and radiation counters.

Iron-59 studies of thalassemia patients have shown that a high number of red cells fail to mature in the bone marrow. Dr. Belcher said the marrow resembles "an assembly line working at a very high rejection rate." The findings, he said, suggest that treatment should be aimed at

improving cell production in the marrow, rather than trying to improve cell survival in the circulation.

In sickle cell anemia, in marked contrast to thalassemia, iron-59 has shown that red cell production in the bone marrow is highly effective. Chromium-51 showed that the cells lived only a short time in circulation, however. In severe cases, a cell may change shape and die in a few days, compared to the normal red cell life span of about four months. Treatment of sickle cell disease, Dr. Belcher said, probably should be concentrated on ways of stopping the changing and destruction of red cells in the circulation, rather than trying to increase cell production in the bone marrow.

These types of congenital anemia may cause only mild illnesses when the disease trait is inherited from just one parent. But when two trait carriers marry, one in four of their children is likely to develop the most severe form of the disease, and may not survive it.

Similar research is under way under IAEA contracts at the Republic Hospital Baghdad, Iraq, and the University of Medical Sciences, Bangkok, Thailand.

• Science News Letter, 80:94 August 5, 1961

NATURAL RESOURCES

Underwater Drums Help Save Water

► A SPIKED DRUM rolling along a canal bottom and an invisible film coating reservoir surfaces are among the projects undertaken by the U. S. Bureau of Reclamation in its fight to save water.

Bureau of Reclamation scientists and engineers are now trying various methods to cut down the 25% to 50% water "loss" from reservoirs, streams and irrigation canals through seepage and other natural "drains." Scientists hope the studies will eventually cut the huge loss in half.

A drum that coats a canal bottom with asphalt to prevent seepage is now being developed, K. K. Young of the Bureau's general engineering department told SCIENCE SERVICE. Spikes or "feet" sticking out of the drum puncture the bottom, releasing liquid asphalt and filling the earthen pores. The underwater roller is pulled by a truck riding along the canal's bank.

Surface reservoirs are also being coated with a one molecule thick chemical, hexadecanol, to prevent evaporation. Although preliminary studies on ponds and lakes show many millions of gallons of water could be saved, the thin film still tends to break apart on larger bodies of water.

Other reclamation projects include redirecting streams in Western states of "trash" plants that use up too much water, and hydraulic studies of dams.

Bureau of Reclamation research and development work in coating irrigation canals alone saved Western water users \$20,000,000 during the past 15 years.

• Science News Letter, 80:94 August 5, 1961

METEOROLOGY

Prepared for Hurricanes

Early warning is given by photographs taken by orbiting weather satellites. Put on guard, people can take necessary precautionary measures.

► WITH Hurricane Anna signaling the true beginning of the hurricane season, U.S. scientists are better prepared to spot and track the tropical storms than ever before.

A weather satellite, Tiros III, whirling overhead looking for weather trouble spots, a sea-going robot automatically sending weather information back to shore, and a more sophisticated hurricane warning radar system blanketing U.S. East and Gulf Coasts have bolstered the weatherman's defense to a high degree of perfection.

Although scientists still can not control hurricanes, the improvements in weather detection have already dramatically reduced the death toll. Willard W. Shinnors, U.S. Weather Bureau meteorologist, told SCIENCE SERVICE. When Hurricane Donna swept across Florida last year, only 13 persons were killed, whereas a storm of similar intensity in 1935 raked the same area and left nearly 400 dead due to lack of warning.

The weather satellite, sea robot and shore radar system hint at what to expect in the next few years. A network of bobbing weather stations (Nomad) will warn

weathermen when a possible storm is brewing in the Gulf of Mexico or Caribbean area. Trouble-shooting U.S. Navy and Air Force weather planes will fly to the area and verify the suspicion. Weather satellites and airplanes will then be used to track the hurricane until it approaches the coast where the especially designed radar tracking stations will take over.

Tiros III took pictures of Hurricane Anna on three different days, the U.S. Weather Bureau reported. But more satellites are needed to tighten the "seeing-eye" network before the weather satellites can be truly effective in tracking the storms.

Weather Bureau efforts against hurricanes are not solely confined to detecting and tracking storms. In August, weather planes will fly straight into the hurricane's center and seed the area with silver iodide crystals in an effort to cut down the energy driving the hurricane. By tracking and learning more about the hurricanes, scientists hope eventually to control the tropical storms.

• Science News Letter, 80:95 August 5, 1961



ANNA FROM ORBIT—Tropical storm Anna photographed from the Tiros weather satellite during its 117th orbit of the earth. The photograph was stored on magnetic tape until the 118th orbit when it was picked up by the Tiros station at Point Mugu, Calif. Hurricane Anna was about 200 miles north of Caracas, Venezuela, at the time of the photograph.

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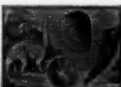
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❁ **KING-SIZE CAN OPENER** with a wooden handle slashes a triangular hole four times as big as other openers. Not much larger overall than other can openers, it has an augmented cutting area of hardened steel.

• Science News Letter, 80:96 August 5, 1961

❁ **MANUAL-MAGNETIC RETRIEVER** will pick up various articles, tools, screws, etc., that have dropped into inaccessible places. It consists of a flexible shaft 13 inches long with a wire-clawed plunger operated at the handle end. A strong magnet can be gripped by the claws and brought into contact with ferrous metal objects that cannot be seized by the claws.

• Science News Letter, 80:96 August 5, 1961

❁ **PUSH-BUTTON STARTER** equips a new ready-to-fly, gas-engine-powered model plane, giving it safety advantages. Located just behind the propeller and protruding through the underside of the nose, the starter is a 1/4-inch-diameter rod, 1 3/4 inches long. To start, the rod is pushed up, the propeller wound, and the rod pushed down. The propeller whirls to fire the engine.

• Science News Letter, 80:96 August 5, 1961

❁ **SAFETY GOGGLES** of butyrate plastic protect eyes at jobs where flying particles or objects are a hazard. The lightweight goggles, shown in the photograph, resist



impact and scratches, and fit snugly over the face and prescription glasses, if worn. Available in green or clear plastic, the goggles also have ventilation holes to prevent fogging.

• Science News Letter, 80:96 August 5, 1961

❁ **BUSINESS CARD HOLDER** is a six-ring, 7 3/4 by 5 1/2-inch plastic binder for hold-

ing business cards and other records. It contains 23 indexed clear plastic pages divided into three separate compartments that will hold cards up to 3 1/2 by 2 1/2 inches in size. Cards will not fall out even if binder is held upside down or shaken. Additional pages can be added.

• Science News Letter, 80:96 August 5, 1961

❁ **TRANSISTOR TABLE RADIO** that can be placed where a line cord would be inconvenient has its own accessory brackets for hanging on the wall. The compact, six-transistor set operates for 600 hours on a nine-volt battery pack. One model has an electric razor-type cord so it can also be used with electric outlet.

• Science News Letter, 80:96 August 5, 1961

❁ **PICTURE-STAMP** enables a person to stamp a photograph of himself on stationery, greeting card or advertising material. A new type of rubber stamp, it can be obtained by submitting a snapshot to the manufacturer.

• Science News Letter, 80:96 August 5, 1961

❁ **SONAR SUB HUNT GAME** to try and test tricky tactics of attack and fleet deployment in the living room includes movable periscopes, submarines, mines, radar screen, counters for scoring, depth charge counter dial, and full playing instructions.

• Science News Letter, 80:96 August 5, 1961



Nature Ramblings



Do You Know?

► **THE MOURNFUL** howl of the coyote, punctuated by the yapping of half-grown pups, long has been a familiar evening sound in the plains and foothills areas. During the last 50 years the sound has moved toward the northeast until today thousands of coyotes are firmly established in the Adirondack Mountains and the New England area.

The push was made not by the small coyote of the West, but by one of the largest coyote subspecies, *Canis latrans thomasi*, or the brush wolf, the New York Zoological Society reported.

To a certain extent, the success of the coyotes, both large and small, is due to the coyote's character, or lack of it. He is quite a coward, where his larger cousin, the timber wolf, has been less afraid of man and has fallen into traps and remained in sight long enough to get shot. The coyote, with more discretion and no valor at all unless absolutely cornered, has slunk away at the first sight or scent of man.

At times, although not so frequently as

Coyote



is generally believed, coyotes will down a deer, and they are a costly nuisance where chickens and young lambs are concerned.

There are, however, two roles in which the coyote is distinctly useful. One is as a scavenger, for the coyote is less discriminating than the wolf and is not above sharing a chance carcass with buzzards and crows.

He is also a beneficial predator of field pests. Probably the major part of the coyote's diet consists of wild rodents such as marjots, prairie dogs and field mice.

• Science News Letter, 80:96 August 5, 1961

Germanium and silicon are currently the most important inorganic semi-conductors.

Imports of steel have exceeded exports since December, 1958.

The sea lamprey in the upper Great Lakes has been held responsible for the virtual disappearance of lake trout.

All leaves on the corn plants contribute to total crop yield.

The swing in the eating habits of Asians is now to Western food because it is easier and quicker to prepare.

Though hawks are by nature aggressive, greedy animals, the male, during the period of courtship and incubation, feeds the female.

Heavy coffee drinkers are inclined to have headaches and feel sluggish when it is withdrawn.

• Science News Letter, 80:96 August 5, 1961